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ABSTRACT

The demand for the associate professional is creating new jobs, providing services, and making greater use of manpower. This demand began in 1956 when the number of white collar workers outnumbered the blue collar workers in the United States. The post-industrial worker is a "knowledge worker," who expresses dissatisfaction with his job because individual performance is not given enough consideration. The force of the non-profit sector of society on the economy has been overlooked, although the steady use of urbanization has greatly increased the need for community services. One important factor on which mid-level scientific, technical and professional personnel will depend is reasonable and accurate occupational forecasting data. Other factors that reduce our capacity to meet the needs of associate professionals are social and cultural attitudes, resistance by professionals, and union, seniority, and bargaining unit constraints. Although many factors work against job restructuring, the benefits of restructuring are evident in increased employee satisfaction. The formal education system needs to be changed to meet the needs of people who for livelihood and for personal growth and fulfillment must engage in a lifetime of learning. The concept of education should be changed to include society as an education system. (GEB)

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Career Opportunities for Associate Professional Manpower

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CAREER OPPORTUNITIES FOR ASSOCIATE PROFESSIONAL MANPOWER

Post-Industrial United States

1. Many forces are contributing to the emergence and development of a new manpower category, the "associate professional."* These forces are especially pronounced in the scientific and technical occupational categories about which this paper is concerned and upon which so much of the basis for the conversion to a post-industrial society in the United States is predicated. The development of the associate professional is creating new career opportunities for many individuals as well as creating new job categories, providing services that heretofore have been neglected, and permitting greater use of our professional manpower resources. The phenomenon is also challenging, as never before, the ingenuity of educational manpower planners.

2. In considering career opportunities for that category of highly qualified manpower, the associate professional, the situation must be dealt with in the context of the dynamic forces that are shaping our society in the United States today and, to some extent, the developing nations of the world.

3. In recent years the term "post-industrial" has been used to describe the United States in the latter half of the 20th Century. Daniel Bell, among others, first used the term to describe the cumulative effect of trends he saw emerging in the 1960s.[1] The term, however, isn't particularly descriptive; nor, does it tell us very much concerning the nature of the changes that are now taking place.

4. A profile of some of the trends Bell and others have identified indicates that, since 1956, the sales and personal services sector of the economy in the United States accounts for more than half of the total employment and more than half of the gross national product (GNP). The year 1956 was a turning point for the United States, and perhaps for industrial civilization, in that for the first time in the history

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* The term "associate professional" that is used throughout this paper refers to those highly skilled individuals who possess less than a baccalaureate degree. It is a more accurate term than the commonly used "para- or sub-professional" and better describes the working relationship of the professional and his skilled support.

of civilization the number of white-collar workers (professional, managerial, office and sales) outnumbered the blue-collar workers (craftsmen, semi-skilled operatives, and laborers).[2] Since that year, the number of white-collar workers in the United States has been increasing, and today white-collar workers outnumber the blue-collar workers more than 5 to 3.5.[3] (See Appendix Tables 1 and 2.)

5. Within the white-collar group, there has been rapid growth of professional and technical employment (less than a baccalaureate level) from 3.9 million persons in 1940, making up about 7.5 percent of the labor force,[4] to 10.5 million in 1971, making up 13 percent of the labor force.[5]

6. The type of "labor" predominating the United States in 1971 is sharply contrasted with the occupational structure of the first half of the 20th Century when the majority of citizens were engaged in primary and secondary economic activities, that is, in farming, extractive industries, and production.* By 1975, we anticipate that no more than one-quarter of the labor force, or approximately nine percent of the population will be directly involved in the manufacturing of products, mining, the growing of crops, and the construction of buildings that our society will require.[6]

7. This has been possible in large measure by the dramatic development of non-human energy sources. Using the energy found in coal, as a base for comparison, the United States uses 10.8 tons per capita (man, woman, child) a year, contrasted with 8.4 in Canada, slightly over 3 tons in both England and Japan each, and about 3.2 tons for the rest of the world. It is predicted that during the decade of the 70's more non-human energy will be produced and consumed in the United States than during the first 70 years of this century.

8. Post-industrial United States is a predominantly educated society. By 1967, 51 percent of our population, 25 years of age and older, had completed 4 years of high school or more; and, 10 percent of the population had completed 4 or more years of college. These percentages are slowly increasing. This is in sharp contrast with the year 1940 in which only 24 percent had completed at least a high school education; and, 5 percent had gone on to complete 4 or more years of college.[7]

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* The United States has become the first nation in history in which more than half of the employed population is not involved in the production of food, clothing, houses, automobiles, and other tangible goods.[5]

9. We are only just beginning to reckon with the implications of these data and to witness some of the consequences of mass education of citizenry. Education is a revolutionary force because it changes a person's self-image, as well as his expectations. An educated citizen is less tolerant of authoritarianism and organizational restraints; he has quite different expectations of what he will put into a job, and what satisfactions he expects to get out of one. These new expectations can operate positively if the institutions of society can respond in such a way as to make work a challenging and intellectually satisfying experience. But risks attend turning a highly educated work force loose on society with nowhere to go. It is a dangerous social "discontinuity," to use Peter Drucker's term.[8]

10. Superimposed on these trends is what is commonly called the "knowledge explosion," and the increasing complexities of the application of knowledge, which often serves to obscure rather than clarify rational relationships. Empiricism, the keystone of a production - oriented society, is now giving ground to theory and an emphasis on theoretical knowledge. Human activity is increasingly being centered on the codification of knowledge into manageable forms, and the use of abstract symbols.

11. Accordingly our post-industrial society places ever greater premiums on theoretical knowledge, and on those who can organize and apply it. The "knowledge explosion" and the speed with which information now becomes obsolete has also had the effect in certain fields of reducing the value of experience to the point where the more recently trained the individual is, the more desirable he is for employment. This is a problem of growing proportions for which we have not yet developed satisfactory solutions. There are some who feel that our educational system may be able to assist in the solutions by providing continuing programs of retraining and reorientation, but more than education is involved. There will also have to be changes in patterns of employment, career development, and in the attitudes and expectations of employers, employees, and society as a whole.

THE "KNOWLEDGE WORKER"

12. The post-industrial worker is a "knowledge worker." While it is fairly easy to take a head count of the numbers of workers whose jobs can be predominantly classified as "knowledge" jobs, as opposed to strictly manual or skills dexterity labor, it is much more difficult to assess the social and cultural impact of their increase in numbers.

13. Some suggest that the knowledge worker in today's organizational structure is a direct descendent of the manual and industrial worker, and not the learned man of old who pursued new knowledge independently.[9] Nevertheless, there are indications that he has distinctly different job expectations from those of the manual, extractive, or production worker. This is really not surprising when one considers how each has acquired his job skills. Someone who has spent 12 to 18 years in a school setting dealing with language, paper and writing and concepts, is very likely to have different attitudes and expectations as to what constitutes "work" than another who acquired his job skills through three to eight years of apprenticeship. For one, "work" predominantly constitutes "ideas"; for the other, the manipulation of "things", although neither to the exclusion of the other.

14. Like the industrial worker, the "knowledge worker" usually finds himself employed in a highly structured organization where his tasks increasingly are determined by the needs of the "organization." He tends to see himself as an intellectual, and seeks rewards or satisfactions from considerations other than an ample paycheck. Less tolerant of arbitrary authority, he expects the demands of a task to be imposed by the knowledge or intellectual content and context.

15. The more cynical have long argued that one useful function of the education system is that of a holding mechanism - some call it an "ageing vat" - to keep people out of the labor market. And they are quite right. In industrialized nations people are living longer and therefore face an extended working life for which the right kinds of jobs are not always available, nor can they be performed by the young. Extended education has been one of the mechanisms society has used to mitigate this problem. There appear, however, to be practical limits as to how far we can extend the holding action mechanism without creating an extremely disruptive social situation that is even now beginning to make itself manifest in student activities and disorders.

16. Many of us have sold ourselves on the idea that a person can't cope with the job requirements in a knowledge society unless he has at least a high school education and now we are beginning to extend this to 2 and 4 years and more of education beyond high school - all in a continuous uninterrupted sequence.

17. What we are really doing is delaying the time when youth can be equal partners in the running of society, at a period in history when in technologically advanced countries such as the United States they are physically mature at an earlier age than in the past.[10] Youth, 18 years of age and over, have also recently been given the right to vote. Although they have already voted in local and State elections,

the first Presidential election in which they will exercise this privilege will be in 1972. We can assume that shifting the voting age downward will have an effect on our society and its outlook - just precisely what this will mean in the long run no one knows. Those who are trained in highly technical specialities are also faced with the problem of possibly having only limited years of work in their chosen careers because the rapid expansion of knowledge and the development of technology will make their current knowledge obsolete. Individuals can no longer expect to find a lifetime of employment in certain fields, especially those that are directly related to technological development or the manipulation of data and theory. This suggests a pattern of sequential careers and the urgent need for alternate education structures and systems to train and retrain the highly skilled and associate professional manpower needed in a knowledge-based society.

18. The job expectations of many of our most highly gifted youth emerging from colleges and universities today - and these institutions are still the main suppliers of highly skilled knowledge workers and managers - are distinctly different from those graduating 10 years ago. There is now a massive questioning of what constitutes "getting ahead" in our society and perhaps some re-definitions of success. There is also serious questioning of the value of the specialized technical education such as may be found in the engineering fields as opposed to the more generalized liberal education. The former now holds the threat of unemployment and career obsolescence instead of a lifetime of high earnings that were promised to those who entered the field in the 1950's. Even though many graduates will settle into standard, traditional work patterns, many of them will not, and they will constitute the change agents in a society that is questioning its values throughout.

19. Organizational structures are becoming more highly specialized, thus the individual must tailor himself even more closely to the demands of his work. Jules Henry has suggested that our industrial progress in the United States has made many people spiritually useless to themselves, in that the worker must give up an essential part of himself to take a job - and this, after an education that stresses the maximum use of personal resources and the opportunities for freedom of choice.[11]

20. The discrepancies between the demands of work and the expectations of individuals often cause severe morale problems at the associate professional level in industrial production jobs. Some United States industries have instituted job enrichment programs to expand the range of participation of the production worker in his job, including his greater involvement in the decision-making processes.

Although there are some indications of success, it is still too early to assess the long-range effect of these programs. We probably are increasing our management skills relative to the industrial production workers, but our skill in managing the knowledge worker lags far behind. And, what is worse, in many instances we're tried without success to apply techniques that are successful in a production setting to the knowledge worker.[12]

21. As this is written one of the largest groups of knowledge workers in the United States, (13 million clerical workers) are making themselves heard. A recent sampling by the Opinion Research Corporation of 25,000 clerical employees in over 90 large corporations shows that there is a marked and growing dissatisfaction among these workers.[13] Much of this stems from their feelings of decreased status, low pay, work that is fragmented and often dull and boring, no leverage with management, and no recognition for superior individual performance.

22. It is significant that, in addition to issues of pay, their major dissatisfaction arises more from perceived loss of status and failure of management to recognize individual performance than for any other reason. These are not the dissatisfactions of the production worker, but rather the knowledge worker whom, at this point, we really don't know how to manage, or how to evaluate his contribution and provide him with appropriate rewards - either psychic or real!

JOB EXPANSION AREAS FOR ASSOCIATE PROFESSIONAL MANPOWER

The Non-Profit Sector

23. For years United States economists have focused their attention exclusively on the profit-seeking sector of the economy as the prime contributor to national growth and development. But our traditional economic model has been found less than perfect because it excluded other economic activities which, although not profit-producing, do stimulate economic growth through the buying and selling of goods and services.

24. Generally these "other economic activities" are lumped together under the designation non-profit, and include government, private non-profit activities, large private enterprises that operate various public services under governmental control such as transportation, communications, utilities, etc.; amalgams such as government-subsidized private enterprise that must conform many of its operations to government criteria; as well as others that are only now evolving.

25. The growth of the non-profit sector (and, unless otherwise noted, this includes government) in the last 50 years has been phenomenal. Between 1929 and 1940 the net increase in direct and indirect employment in the non-profit sector was almost twice as great as the net growth in total employment. In the decade of the 1950s the non-profit sector accounted for over 85 percent of the net increase in total employment, and provided nine out of every ten new jobs added to the economy during the period.[14]

26. Government, the largest component, accounts for most of the job expansion in the non-profit sector, stimulating job expansion directly in the non-profit sector and, indirectly, in the private sector. From 1960 to 1968 employment in government grew at the rate of 4.5 percent a year, nearly 2½ times the rate for total employment.[15] In 1970 more people were employed in this sector at all levels, and represented 17.8 percent of total employment. More were working in government than in mining, construction, transportation, finance, insurance and real estate combined. While Federal employment is expected to remain relatively stable, an ever larger role for State and local government is projected.

27. The steady urbanization* of the United States has stimulated the need for various community services, which private industry either cannot or will not provide, and, which the individual citizen cannot supply or accomplish for himself. Great concentrations of population are now requiring community services that extend far beyond the traditional public functions of fire and police protection.

Expansion of Special Services Units of Government

28. The Constitution of the United States provides for the creation of the Federal and State governments, that is, for 51 units of government. There are, however, over 80,000 local units of government in the United States, which were created by the States. In addition to our basic Federal, State, and local governmental units, we have highly specialized

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* Herman Kahn and Anthony Wiener in their book, The Year 2000 have suggested that by the year 2000 anyone wanting to study the U.S. will have only to concentrate on three gargantuan megalopolises -- "Boswash" extending from Boston, Massachusetts to Washington, D.C.; "Chipitts", the Great Lakes complex extending from Chicago, Illinois to Pittsburgh, Pennsylvania; and, "Sansan," the Pacific megalopolis stretching from San Diego, California to Santa Barbara, California and ultimately to San Francisco, California.

units of government, such as, soil conservation districts, dog control districts, and mosquito abatement districts. It is in these specialized units that new employment in government is being created as opposed to units of general government - Federal, State, city or county.

29. New York, our second most populous State, is an example of proliferating units of government. It has no less than 965 of these special units, only 238 of which are coterminous. When the people in one of the larger governmental units have a problem, they tend to create another special unit of government to deal with it; put a board over the activity; and, give the board rule-making power and the power to levy against the property tax, or earmark certain revenues to finance the activity, e.g. water tax. This has resulted in extremely undisciplined growth of governmental units that frequently have no relationship to each other, or to the larger units of general government. The implications of this expansion activity for job creation and development for mid-level associate professional, and technical personnel in units of specialized government are enormous.

30. There is a great need to bring order to these proliferating special service units. And while the Congress can exhort the States to induce some order, it has no Constitutional authority over State structures and local governmental organizations. Nevertheless, as the Federal Government seeks to return more Federal tax revenues to State and local governments for the provision of urgent public services, the States are going to have to organize and develop the technical and management skills needed to deliver those services.

Growth Areas in the Non-Profit Sector

31. Increased efforts to make urban areas more livable will stimulate activities and increase the employment of the associate professional in such activities as environmental control, health, and urban renewal. State and local governments are under pressure to expand their budgets for recreation, including the development of parks and other natural resources. Recreation, for example, has previously comprised a very small part of most governmental budgets, but the Bureau of Labor Statistics now predicts that it will be among the fastest growing in terms of total governmental expenditures with increased demand for the associate professional.[16]

32. In spite of the recent increased Federal dollar input, education is expected to continue through 1980 to take the lion's share of State and local governmental budgets, as Federal funds still constitute less than .7 percent of the revenues for elementary and secondary education.

33. Second to education, the health industry stimulates the most employment for the associate professional in the non-profit sector. Although in recent years, government has assumed a larger share of health industry employment, this vast industry has generally been supported by non-profit institutions other than government. Growth of employment in the health industry is attributed not only to new and more effective techniques, but also to job restructuring within specific occupational fields, a direct outgrowth of the shortage of health professionals and the attendant necessity to free them from the less technical tasks.

34. The Bureau of Labor Statistics reports that the number of associate professional jobs requiring less than a bachelor's degree, but mid-level post high school technical training has grown by 200 percent since 1950; and future career opportunities appear equally promising. According to the United States Public Health Service, requirements for associate professionals in the health field (medical, dental, environmental related) will increase from 704,200 positions in 1967 to an estimated 1.2 million by 1980.[17]

35. Within the total allied health field, the number of occupations requiring at least the baccalaureate degree is expected to increase. This group comprised 23 percent of the total allied health field in 1950 and is expected to represent 31 percent of the group by 1980.[18] Expanding and more complex technology probably contributes to the increased educational requirements as does "professionalization" or licensure of new occupational areas.

36. Included in the expanding allied health field are occupations with such titles as Physicians Assistant (still really in the pilot state of development), Inhalation Therapists, Occupational Therapy Assistants, EEG Technicians, Optometric Assistants, and Physical Therapy Assistants. An accurate assessment of job requirements is impossible at this time because of the lack of a taxonomy and because certification and licensure laws vary significantly among the States.

37. The environmental control field is expected to stimulate expanded employment opportunities throughout all sectors of the economy, but particularly in the governmental sector. In order to tackle massive environmental problems we must greatly expand our scientific and engineering skills related to the field, including the development of highly skilled support personnel at the associate professional level.

38. In the short time since February 1970 when our national environmental effort was formally announced by the President, we have quickly learned that while there is rhetoric and enthusiasm, delivery

systems are limited both in the application of the vast knowledge and technology that could be applied to environmental problems and in the technically trained manpower to do the job.

39. For example, within the retraining programs authorized under the Federal Government's Manpower Development and Training Act (MDTA) it has been difficult to identify the types and numbers of environmentaly related jobs that are available, especially since State and local governments are finding it increasingly difficult to provide sufficient revenues to meet the need for expanding public services.

40. Thus the need for highly trained professional, associate professional, and support personnel in the environmental field are only now being identified. One investigator into environmental manpower needs, a former staff member of the Federal Council on Environmental Quality, suggests that the five areas of environmental management -- ecology, earth sciences, resources and recreation, environmental design, and environmental protection -- will grow from 655,990 professional and associate professional jobs in 1970 to 1.18 million jobs by 1980.[18] (See Table 3 in Appendix.)

41. A number of factors appear to make these projectsions reasonable: public opinion is marshalled behind the necessity to tackle our environmental problems; the Congress in turn has addressed itself to the problem by enacting the National Environmental Policy Act of 1969 and the Environmental Quality Improvement Act of 1970, two laws which establish a permanent policy and program; and, finally, the anticipated fiscal support for these programs to State and local governments in some form of revenue sharing by the Federal government.

Employment in the Private Sector

42. The private sector is still the overwhelming employer (seven out of ten) of the some 970,000 engineering and scientific technicians identified in 1968.[20] Most of these were employed in electrical equipment, machinery, chemical and aerospace industries. In the latter industry, however, the demarcation as to what constitutes "private" and "public" sectors becomes blurred. Recent industry cutbacks as a result of decreased defense related activities, have made the Nation much more aware of the extent to which subsidization of the aerospace industry has created job opportunities for not only graduate engineers and scientists, but also mid-level scientific and technical personnel, many of whom are now unemployed. (See Appendix for a more detailed discussion of this current problem.)

43. The non-profit sector lags behind the private sector in numbers of engineering and scientific technicians employed. In 1968 the Federal Government employed some 90,000 technicians; State governments, 60,000; and local governments more than 25,000.[21]

44. By 1980 the Bureau of Labor Statistics predicts that the requirements for engineering and scientific technicians will reach 1.4 million, an increase of almost 45 percent above the 1968 levels.[22] The increase is attributed not only to industry expansion and technological change, but also to expanded demand for professionals in engineering and scientific fields.* The areas of greatest need will be in computer analysis, programming, urban planning, recreation, social work and economics and engineering -- mostly jobs created in the non-profit sector.

45. Data relative to the numbers of mid-level technical and scientific support personnel are inconclusive. The label "technician" is part of the problem; and, it relates specifically to some of our cultural biases toward certain kinds of work. Contrary to many European countries, technicians in the United States do not have the same status nor a clearly defined role. Many of the bright young technicians coming out of two year technical schools or community college curriculums find jobs in their specialties quickly but then move up and out of the category, frequently into management and management assistant positions, or positions that have more of a "professional" connotation. This mobility is not undesirable, but it serves to confuse data on the numbers of technicians.

46. Whether the demand of the decade ahead for mid-level scientific, technical and professional personnel, is met depends upon many factors not the least of which are reasonable accurate occupational forecasting data. While the needs for skilled and associate professional manpower can be roughly projected in the aggregate, these projections are less than satisfactory for the educating systems of our society, which must plan specific programs of education and training; and, for individuals who must make career choices based on a reasonable expectation of employment after training.

CONSTRAINTS TO THE DEVELOPMENT AND UTILIZATION OF ASSOCIATE PROFESSIONAL MANPOWER

47. In addition to the problems of developing accurate occupational forecasts, there are other barriers that reduce our capacity to meet needs for highly skilled and associate professional manpower. Many of

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* The National Industrial Conference Board suggests that the optimum ratio of technician to scientific or engineering personnel is about 3 to 1. Actual ratios are falling well below this.

these are complex and formidable as they involve both cultural attitudes and the necessity for institutional change. I am referring specifically to some of our social and cultural biases that preclude entry into certain types of occupations; job classification and seniority systems; and, licensure, as well as rigidities in educational structures.

Social and Cultural Attitudes

48. In the United States there are distinct cultural attitudes towards certain types of occupations that preclude a movement of people into them, even through personal aptitude and interests would indicate success and labor market demands exist for them. These attitudes persist in spite of a conventional value, growing out of the Protestant-Puritan work ethic, that all work has dignity and is of equal social worth.

49. There is, for example, a particular bias for those types of occupations that require the baccalaureate degree and above, the prestige courses! Perhaps it is not so much a conscious and purposeful decision for a particular occupation as it is for the acquisition of the college degree that is becoming ever more important in our "credentialled" society. A recent task force on higher education calls this obsession with the degree our "socially conditioned reflex."[23]

50. Through a host of experiences individual attitudes toward work and specific types of work are formed. It doesn't take long, for instance, for a child to learn what people in the community his parents regard with respect, and why. Nor does the casual derogatory remark made in innocent exasperation about the mechanic or plumber go unnoticed.

51. The National Advisory Council on Vocational Education condemned this attitude in its first annual report, July 1969:

> "At the very heart of our problem is a national attitude that says vocational education is designed for somebody else's children. This attitude is shared by businessmen, labor leaders, administrators, teachers, parents, students. We are all guilty. We have promoted the idea that the only good education is an education capped by four years of college. This idea, transmitted by our aspirations and our silent support, is snobbish, undemocratic, and a revelation of why schools fail so many students."[24]

52. Moreover, other factors mitigate against achieving a higher status for skilled jobs that require less than the baccalaureate degree. In this regard, data on secondary education is revealing. Over 80 percent of our 14 million high school students never enter a vocational or technical skill program. About 60 percent of the high school graduates

in 1969 entered college. Based on current college completion rates 70 percent of these high school graduates will not complete the 4 years of undergraduate work or achieve the first professional certificate. Too many students are pursuing one particular type of goal -- 4 years or more of higher education -- and apparently are offered few other alternatives. This bias pervades even the Federal government, which invests $14 in the Nation's universitites for every $1 it invests in vocational and technical education programs.[25] It is also apparent in local school systems that drastically shortchange occupational preparation in favor of the academic preparation for the next level of education.

53. It is difficult to deny the "economics" of education even though we are not quite sure just what it is in the process that makes a person's life more remunerative. The average college graduate can look forward to more than half again as much lifetime income as a high school graduate and twice as much as a person who only completes eighth grade.[26] No doubt this is influential in occupational choice.

54. The title of a job has acquired certain positive or negative connotations, which in turn reflect on the desirability of the job regardless of working conditions, pay or chances for advancement. A popular illustration of this was the changing of such job titles as janitor, garbage collector, and dog catcher to building engineer, sanitary engineer, and dog abatement officer, all of which occurred at a time when engineering was the status occupation. This also works in reverse. An unemployed aerospace engineer, who recalls the status and prestige of being employed in that occupation, is most likely reluctant, or would probably refuse to accept training or a job as the operator of a water or sewage treatment plant, even if pay and fringe benefits were equal or better than those he received before. This is simply because the status and prestige of his previous job would be lacking to him and his family.

55. These types of attitudes are firmly rooted in American cultural patterns such as the practically unquestioned belief in the efficacy of education and the assumption that anyone can strive to what he perceives to be the top, and arrive. Unfortunately these job prejudices inhibit the range of individual job choice and make it more difficult to meet the demand for highly skilled manpower.

"Professionalization" of Occupations: Licensure, Certification and Accreditation

56. Through accrediting schools to provide approved training courses and by certifying who will be members, professional organizations often define the parameters of an occupation. Pressure on State and local

governments follows to license -- and regulate -- those who will practice in a given State or locality.

57. While these systems required by professional organizations and governments are instituted to protect the public against the incompetent or unethical, they often prove formidable barriers to expanding employment opportunities in emerging occupations and in meeting urgent needs for highly skilled and associate professional manpower.

58. The increased demand for health and other human services has aggravated and highlighted, some of the rigidities of these systems, particularly where the development of associate professional manpower is concerned.

59. Although other professions have some form of regulation of varying degrees, the health services industry is illustrative of large numbers of different types of occupations, at varied skill levels, many of which are only recently identified. In a relatively short period of time, for example, some 20 allied health occupations have come to require accredited training programs; and the American Hospital Association now extimates that nearly 200 identifiable health occupations exist.[27]

60. A study undertaken jointly by the American Hospital Association and the American Medical Association and reported to a National Health Forum in March 1971, of the rapidly proliferating numbers of societies and associations growing up to protect various health occupations through licensure or certification or both, found the field so confusing and difficult to evaluate that they recommended through the National Health Forum to the State jurisdictions that a "moratorium be declared" on further certification or licensure by statute. Among the reasons given are the following: (1) General lack of any type of reciprocity between State jurisdictions. States without training facilities for certain types of mid-level technical people anxiously seek and give licensure reciprocity to students licensed in other States. Other States having adequate training resources are under pressure from various associations to control the number of practitioners through licensure restrictions; (2) the rigidity of many licensure and certification processes often work to inhibit rather than promote career upgrading; and, (3) Corollary union-management agreements which almost certainly develop as new health occupational groups seek licensure protection also tend to inhibit career mobility and control supply and demand of mid-level scientific and technical people in the field.[28]

61. The "professionalization" of a relatively recent health occupation, "inhalation Therapist" or "IT", forms an interesting case study. This occupation emerged only in 1960, yet its evolution has been so fast that the functions performed by the "IT" in 1960 are now being performed by

the "IT" technician, one of the newest sub-specialties on the scene. The principal difference between the technician and the therapist, says the American Association for Inhalation Therapy, is that the "IT" has more responsibility for patient care and more opportunity for immediate advancement. Important, too, is the fact that the "IT" is in a higher salary bracket than the technician.

62. In 1960, one year of on-the-job training and clinical experience was required to become a therapist. At the present time the American Registry of Inhalation Therapists, Inc. (also newly emerged) requires two years of college, plus "IT" training before one can be listed in its Registry. The Registry adds that "registered nurses and those with bachelors degrees in biological or related sciences who have 96 hours in a school of inhalation therapy are also eligible to become Registered Therapists."[29] So there is some limited opportunity to transfer laterally from related fields.

63. The "IT" Supervisor at one of the Nation's leading medical schools predicted a day soon when a college degree will be required. As the "IT" advances in salary, training, specialization, and as technology becomes more complex, the technician will surely follow to fill the vacuum, no doubt later followed by "IT" assistants and "IT" aides, etc.

64. The formal controls mentioned -- certification, licensure, accreditation -- are only part of the legal controls affecting training and practice in an occupational field. Particularly in the health field, other controls such as State hospital licensing laws requiring certain staffing arrangements, Federal regulations under Medicare and the certification of Medicare facilities, all serve to control supply and demand in an occupation.

65. Fortunately, according to Greenfield and Brown (Allied Health Manpower: Trends and Prospects), things have a way of getting done:

> "Licensing laws are quite difficult to enforce. If the work must be done, the hospitals will find a way of doing it -- by assigning a non-professional to a professional position, by keeping him in a non-professional position but assigning the professional tasks to him, or by assigning titular 'responsibility' to an absent physician. If a law were sufficiently watertight to detail exactly what acts could or could not be undertaken by specific people, it would also limite the ability of the institution to deliver services."[30]

66. In addition to the moritorium on licensing, which was mentioned, professional groups related to the health industry are suggesting other actions to increase reciprocity between States and enhance a more flexible occupational structure. Among these actions are: development of guidelines by the Federal government for setting minimum qualification

standards for clusters of occupations; expansion of State medical practice acts to allow physicians broader power in assigning tasks to allied health care personnel; and, establishment of educational equivalency measures and job performance tests as alternative routes to licensure.

67. "Professionalization" affects other occupations but not to the obvious extent of the health professions. In scientific and engineering fields, technicians generally are required to have two years of training, which can be acquired in a variety of arrangements. At present, however, most technician occupations in support of professional engineering have few of the trappings of "professionalization" such as certification and licensure requirements.

68. In the human services, in health as well as in welfare and in education, the "new careers" movement has at times come to a dead-end against the rigidities of "professionalization." This attempt to restructure jobs and provide career ladders for those who do not meet initial entrance requirements, has met professional oppostion and roadblocks in getting professionals to delegate tasks to those who enter as associate professionals. For those coming into the field at less than professional level, educational requirements are a frequently encountered barrier to advancement. There are encouraging signs, however, that many professional groups are attempting to devise ways of crediting experience in the human services in order to meet occupational requirements.

Unions, Seniority, Bargaining Unit Constraints

69. Unions, like other work force vested interest groups, came into being because they were needed to protect the interests and welfare of these groups and to give them leverage for improving their position relative to management or other employer hierarchy. The individual voice simply counts for more when joined with those of like interest and persuasion.

70. The structure of agreements between management and the work force within an organization will have an effect on promotion and transfers of employees. Where an entire organization is covered under a single bargaining unit, transfers between job categories within the organization are easier to accomplish. On the other hand where within a single organizational unit there are several agreements between management and the work force, opportunities for transfer are restricted. Should an individual transfer to a different bargaining unit he usually loses all the seniority he had previously acquired. Seniority provisions are designed to be protective to the worker and loss of seniority can have

serious consequences. This latter condition, multi-agreement situations within an organizational unit, can severely restrict worker mobility with resulting implications for career development and career mobility.

71. Illustrations of institutional rigidity as found in unions, trade associations, and professional societies are legion. A few examples, however, will serve to further illustrate how they impede mobility both into an occupational field, and up the job skill ladder; as well as interfere with the expanded application of new knowledge. An analysis of a recently negotiated teacher union contract in a major city shows as many as 6 different types of teachers in the job classification and certification heirarchy, with periods of service carrying as much if not more weight in progressing from aide to "professional" teacher - particularly at the lower associate professional level.

72. A recent study of the transfer of military-acquired skills to civilian jobs is another case in point.[31] The study found that numbers of ex-military pilots were unemployed because of commercial airline seniority rules. Qualified, highly experienced pilots were required to start on a semi-apprentice basis at comparatively low pay. Yet the airlines themselves foresee a continuing need for experienced pilots, stemming from the fact that two-thirds of all airline pilots who were active as late as 1964 would be forced to retire by 1977. While we are currently seeing the expansion of aviation courses in junior and community colleges, which are turning out more and more highly trained "educated" pilots, the seniority rules, as currently practiced by the airlines, may preclude many of them from entering the commercial aviation field.

73. In her book The Process of Work Establishment, Marcia Freedman found that variance in individual promotions could be largely explained by employees' length of service, whether these promotions were meaningful (title changes reflecting skill differences and more pay) or were nominal routine promotions requiring relatively little screening. While specific courses were sometimes significant, the number of years of formal education of an individual accounted for little in meaningful variance in promotion practices. Dr. Freedman also found that most of the substantive promotions actually took place in the early years of service, thereby serving to "lock" employees both into firms for which they worked and into specific jobs.[32] As a result, some associate professionals concluded they would have been better off to have gone an extra two years and gotten a degree because it would have given them a higher entry level starting position.

74. The ecological movement may run head-on into both professional and union management bargaining unit roadblocks. Some are criticizing the movement as a real job threat; paying little or no attention to the potential effects of plant close-downs and changes in technology prompted

by governmental regulation. The threat of plant closings is a technique used by some recalcitrant companies to block pollution regulation requirements. Where the few closing have occurred, most of the plants were marginal operations. This is not to absolve those who impose the regulations from any responsibility in job lay-offs. Like in the problem of displaced scientists and engineers, the government does have a role to perform in mitigating human dislocations caused by changing federal priorities and funding constraints.

Classification Systems and Job Restructuring

75. Lack of a commonly accepted taxonony in new and emerging occupational classifications, makes job restructuring very difficult. Some giant strides have been made toward developing common terminologies for many occupations. Our most notable work in this regard is the Dictionary of Occupational Titles compiled by the U.S. Department of Labor. Even the authors of this impressive document make no claims to it having the comprehensiveness necessary to describe the occupational activity in which Americans engage since they are always faced with a time-lag in supplementing the Dictionary. The work-world is too dynamic to maintain current, up to the minute job analysis data at least with our present system of classification and definition. The U.S. Department of Labor is currently working on a job data bank which holds much future promise.

76. The lack of a taxonony acceptable to all concerned is illustrated in a recent report of a survey by the Federal Water Pollution Control Administration of New England water treatment plants in which the following job titles were identified for employees performing almost identical services: Sewage Treatment Plant Operator; Maintainer I and II; Foreman; General Foreman; Water and Waste Processing Specialist; and, Attendant.[33] The Dictionary of Occupational Titles, on the other hand, lists the titles for essentially the same (but not identical) services as: Sewage Disposal Worker; Sewage Plant Attendant; Sewage Plant Operator; and, Senior Sewage Plant Operator. It is evident that at the present time there are few comparable job classifications for water treatment plant operations. Yet, these are for the most part all mid-level scientific or technical jobs requiring some specialized post-high school training, often coupled with on-the-job experience.

77. Regardless of the sophistication of our job classification systems, we tend to focus on the titles and treat the job in a comparitively isolated manner. It is here that the job classification process itself becomes a barrier, because particularly at the associate professional level, many jobs share skill commonalities. I am convinced there is much more skill transferrability, for example, between the laboratory technician who works in the medical, water pollution, or marine biology fields, than is commonly realized and accepted. Another associate professional, the

electronics technician, performs similar skills whether he is testing computers or maintaining and testing equipment in intensive cardiac care units in a hospital. Yet the former is generally classified as an "industrial" worker; and, the latter as a "medical" worker with each category having its own peculiar job hierarchy.

78. A recent study reported that 85 percent of all Armed Forces enlisted men's career jobs have counterparts in civilian employment. At least 1,500 different civilian jobs were represented in the hundreds of Armed Forces training courses examined.[34] The mid-level scientific and technical occupations -- electronics, technical, and mechanical -- comprised nearly 50 percent of all enlisted men's skills.

79. With the exception of being released from service at a time of over-supply, the barriers cited by this study are essentially those that affect the transition into types of employment in the civilian sector: educational requirements not pertinent to the job to be performed; and, job titles that tend to make employers wary. Some military job titles -- "munitions/weapons maintenance," for example -- are not descriptive of skill requirements, yet the technical knowledge required to repair intricate weapons systems could be applied to many jobs requiring associate level ability in math, electronics, basic science, etc.

80. In the case of many recently displaced scientists, engineers, and technicians, it is often found necessary to convince the person with a specific job title from his last employment that he can function well in other types of jobs that may be related, but with different titles and professional relationships. Seminars have been established for the purpose of helping professionals and associate professionals overcome these barriers. Potential employers also have to be sold on the transferrability or interchangeability of skills.

81. Like college graduates who have specialized, the enlisted man coming out of the service with a specialized technical or scientific skill, is likely to make the easiest transition into civilian employment at the associate professional level. The picture for scientific or engineering officers who generally are at the professional level, however, is somewhat less favorable, as they frequently find themselves behind their civilian co-workers as a result of the constraints of licensure, seniority, civil service rules, discussed elsewhere in this paper.[35]

82. Just as there is some difficulty in transferring military-acquired skills into employment in the civilian sector, so are there roadblocks in transferring skills between the public and private sectors. The Federal Civil Service and State Merit Systems are currently the subject of much intense analysis and self-analysis concerning their job classification and "career ladders" for upgrading purposes. In view of the urgent need for more and better public services, and the probable

continued expansion of employment in the non-profit sector, this scrutiny is more than timely, as many of these job classification structures have been in existence for some time and need to be overhauled.

83. Under a grant from the U.S. Office of Education, the Institute for Local Self Government in California undertook to accurately describe each one of a number of different public service jobs in terms of the actual abilities needed to perform different tasks. Educational requirements were examined in light of duties to be performed; and, finally, curriculum guidelines were developed in the respective areas of specialization, to be used by junior and community colleges in training associate professionals for work in government and public seryice. The number of job titles were reduced, and some comparable taxonomies developed.[36]

84. Job restructuring has also been a vital element in recent job enrichment activities in industrial settings. From this experience it appears that job restructuring can be more easily imposed on younger and smaller companies, primarily because they are less encrusted with tradition, and do not have to fight the bureaucratic snarls barring change in larger corporations. The same is also true in the non-profit sector. Contrary to standard myth, the United States is not a nation of large corporations, but of smaller corporations and businesses. (Large establishments employing 500 or more persons account for only a little more than one-fourth of the total employed.[37] For example, there are over 50,000 employers in New York who hire 10 or fewer people.)

85. Job restructuring, particularly in the non-profit sector can expand employment at the associate professional level; and, facilitate the delivery of more and better public services. But this activity must be related to the "real world," the environment outside of the corporate structure or the governmental agency, or it is futile and of short-term benefit.

86. As I have indicated, many factors mitigate against job restructuring and the development of career progressions, but when successfully accomplished, few deny the benefits in increased employee satisfaction efficiency and productivity.

Education Structures and Systems

87. No one factor in the United States has as much direct bearing on the success or failure of people in the work force as the educating systems; no other systems present as many gaps and discontinuities. In this day of social revolution I tend to agree with the statement that the problem with existing societies is not how to stabilize them but

how to change them. Our educational systems present some major barriers to those who wish to enter an increasingly skilled labor market; who wish to seek additional skills to upgrade themselves; or change to other employment.

88. In the United States as in many countries, the systems devised to educate citizens are structured in a progressive manner: kindergarten through grade 12, then either junior or community college work, or, on to a 4 year institution of higher education. Each "grade" seems to be principally preoccupied with preparing people to go on to the next grade level with little or no job or career orientation along the way. At the periphery of the formal educational establishment are alternate systems such as on-the-job training*, business schools, technical institutes, and vocational schools.

89. More than ever we are providing opportunities for formal education for a greater percentage of our citizens, and for longer periods of time. A few statistics will highlight this: today about one-half of our young people enter college; 20 years ago this figure was less than 25 percent. Total outlays for higher education, public and private, have been increasing at two-and-one-half times the rate of increase in the Gross National Product, which itself has grown nearly four-fold since 1950. In addition to the formal educational opportunities, more than 44 million Americans in one year, 1965, participated in educational programs conducted outside of the traditional educational institutions, and run by business, government and the military to upgrade their employees.[38] The 20,000 public school systems, kindergarten through grade twelve, and the more than 2,400 institutions of higher learning offer almost unlimited potential for career opportunities for the aide and the associate professional, with whom this paper is primarily concerned. Yet these opportunities are often stifled by an archaic notion that a minimum of a BA is needed to teach, and by licensure, seniority systems, etc., that put a premium on survival rather than job performance, merit, product, accountability, etc.

90. In spite of the extent of peripheral education activities, a majority of the Nation's highly skilled professional, associate professional, technical and managerial manpower is trained in the formal system by non-profit and governmental institutions. The "respectable" credentials come from the core system; thus what we recognize as the credentialling system outweighs the peripheral systems in importance -- but not necessarily in quality of educational content or relevance to the work-world. (See Appendix Table 4.)

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* Although on-the-job training may be on the periphery of the formal educating systems, it still constitutes one of the largest "educating" mechanisms for adults in the United States.

91. Unfortunately, we tend to concentrate our institutional education programs in a relatively few years of the life of an individual. By the age of twenty or twenty-two one should be "through" with education. This notion is totally unrealistic in light of the need for more highly skilled manpower and the rapid technological development and information explosion. It has always been unrealistic in terms of the educational needs of people, which continue throughout their lives.

92. Although strong ties exist between the vocational education system and the business community in the United States, this cannot be said of our total formal educating mechanisms. This, I know, is more descriptive of the United States than many other countries, which have excellent systems of integrating the economic life of the country effectively with the educating systems. But for us, with the exception of summer jobs, not enough young people in high school and college have a first-hand association with an occupation save that of being a student.

93. Thus through an isolation from the working world, many students are ill-prepared to make sound career choices particularly in a world of work that perpetuates the Protestant-Puritan product-oriented work ethic of an industrial agricultural age into a post-industrial society where work is better described as any positive and productive activity that is socially (and perhaps economically) useful. They are making major decisions about their lives without knowing they are making them, i.e., it is the social "thing" to go on to institutions of higher education, with no thought of what they are going to "do" upon leaving after or before completing 4 years. The traditional work-models afforded children in a more agrarian society are virtually absent.

94. In 1970, 70 percent of all 11th and 12th grade students were enrolled in general and academic courses; only about 30 percent were enrolled in vocational courses. Yet only 20 percent of American youth can reasonably expect to finish four years of college and receive a bachelor's degree. These facts alone point out that our educating systems need to be restructured in spite of the phenomenal growth in formal education beyond high school. The systems, together, do not now serve the needs of all of the people, nor are they adequate to the dynamics of a post-industrial society.

95. Some recent trends are offering a promise of change. Open admissions policies and the growing acceptance of part-time students give older students an increasing chance to enroll at community colleges, four-year state colleges, and a few universities. In 1969, there were more than 860,000 students enrolled part-time at public community colleges.[39] While it is impossible to know how many were older students, a rough estimate is that they compose between one-fourth and one-third of the group.

96. Stanford University's late President, Ray Lyman Wilbur, once said that "changing a curriculum is more difficult than moving a graveyard." From my experiences in educational administration, this statement has a good deal of truth in it. Curriculums represent a considerable barrier. Too many college and high school students are faced with curriculum and course requirements for which they have absolutely no interest, and for which no need has been demonstrated. Nondegree associate professional needs are, for example, estimated to outnumber engineers and scientists by two or three to one in most technical organizations, yet our major thrust of training has been directed toward baccalaureate and the post-baccalaureate levels.

97. The community and junior colleges, educational institutions in which there is much current interest, are at present the greatest trainers of associate professionals who require less than the baccalaureate degree. Many appear to be hopeful concerning them, and they have been described as:

> "....career centers for young Americans of every class and every race, and for older citizens as well as those who seek midcareer retraining. They are, today, a largely untapped resource for the returning veterans...They are oriented to the new technology, to the practical sciences, and increasingly to the development of (associate professional) disciplines in health, in computer science, in social services, in teaching itself....In other words, they are in tune with the vocational skill needs of an evolving technological era whose 'useful trades' are all the arts and sciences that must be harnessed to preserve a decent human environment and develop humane social institutions."[40]

98. The Bureau of Labor Statistics makes a rather bleak forecast concerning the implications for the future for the less educated worker. In its survey of the needs for college-educated workers, 1968-80, the Bureau of Labor Statistics concurred in substance with the Freedman study when it stated:

> "Those without a degree may find it more difficult for example, to advance to full professional status in occupations such as engineer and accounting or to achieve high-level management positions. Applicants not meeting the full educational qualifications may also find it increasingly difficult to obtain temporary employment in their field while completing requirements."[41]

99. More than any other facet of post-industrial life, the "knowledge explosion" has vast implications for individuals throughout their working lives; the expansion of employment opportunities for highly skilled associate professionals; and, for the educating mechanisms of our society. Because of the complexities of managing knowledge and the speed with which information becomes obsolete, we are approaching, if not already in, an age of serial careers, in which constant retraining is mandatory for employability.

100. Even with drastic reshaping, it is doubtful that our formal education systems can meet the needs of people who for livelihood and for personal growth and fulfillment must engage in a lifetime of learning. Looking beyond the formal education system, we should broaden our concept of education to include society as an educating system. We need to expand opportunities for learning and to recognize that learning can take place anywhere, and in an enormous variety of non-degree programs.

101. The acknowledgement, and effective use, of a larger educating system is vital to meeting our needs for associate professionals, but, without question, more than education is involved. There will also have to be changes in patterns of employment, career development, and in the attitudes and expectations of employers, employees, and society as a whole.

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CAREER OPPORTUNITIES FOR ASSOCIATE PROFESSIONAL MANPOWER

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APPENDIX ж

EFFECTS OF CHANGING NATIONAL PRIORITIES: DISPLACED SCIENTISTS, ENGINEERS AND TECHNICIANS

During 1970 and 1971, the United States has experienced a phenomenon quite foreign to the country since the days of the Great Depression: a sudden increase in unemployment among some of the most highly-skilled members of the work force, the scientists, engineers, and technicians.

For years, the job market eagerly wooed this occupational group with visions of intellectual independence, exciting projects, and appealing fringe benefits. They were not even remotely considered an "employment problem". The national government, instead, directed its attention to erasing the last pockets of unemployment among those with the least education and skills. Now we are forced into acknowledging this new group of unemployed that we thought could always fend for itself in the labor market. Through this scrutiny we are learning some useful things about our economy and our society.

The economics behind the displacement of so many of the highly skilled are complex and involve governmental, fiscal or monetary policies; the overall vigor of the national economy; and the diversity in local economies. The potential for this displacement, however, was not entirely unforeseen.

In 1965, some economists observed that we were paying too little attention to the effects of any potential cutbacks in government defense and research programs, both of which encouraged the development of highly specialized manpower. The pervasiveness of the research and defense industries doing business with the government should have prompted some reflection. Approximately 5,500 cities and towns have at least one defense plant or company doing business with the Department of Defense. In addition there are about 1,000 installations within the U.S. engaged in defense, atomic energy or space operations and research.[1]

Part of our complacency stemmed from the assumption that if any of these skilled people were displaced, they could be quickly absorbed by other employment in the private sector.

Largely supported by government defense and space program contracts and the airline industry, the aerospace industry reached its zenith in 1968 with the employment of 1.4 million workers, many of whom were highly skilled. Since 1968, employment in the industry has dropped by almost 400,000.[2] The Bureau of Labor Statistics estimates that among these jobless are highly educated workers, including technicians and other other associate professionals. Although the unemployment rate in June, 1971 for all engineers was only 2.9 percent of total unemployment,

ж See page 10 of the present document

it was more than 10 percent for the aerospace engineers.[3] The rate of unemployment is probably even higher for the numbers of highly skilled technicians who support professionals in the industry.

The extent to which displaced workers have been absorbed has varied, in part, according to the diversity of the economy. Marietta, Georgia, the home of Lockheed-Georgia, Inc., and Seattle, Washington, the location of the giant Boeing Corporation, are contrasting examples.

Seattle, one of the hardest hit areas, is practically a one-industry town. During 1968 when aircraft employment reached an all-time peak in the area, the industry accounted directly, or indirectly through subcontractors for over 60 percent of all manufacturing jobs. A 1971 Labor Department survey indicated that there are about 1,700 unemployed scientists, engineers and technicians still in the labor market area; and, that the total is likely to exceed 2,000. The training and experience of many of these people is so specialized in aircraft manufacture as to make transfers, without extensive retraining, difficult. Others, including most of the approximately 200 mechanical engineers, could probably transfer to different industrial activity if opportunities were available.[4]

The Marietta industry presents a different picture. From a peak of some 33,000 employees in August of 1969, Lockheed has laid off more than 12,000 workers. Plant officials predict that by the end of 1971 only 17,000 employees will remain.

Although the cuts are severe, and the personal impact great, the effects on the local economy have not been disastrous. The reason given is the diversity of the businesses and industries undergirding the economy. At a time when the aerospace related workers were losing their jobs, other aspects of the local economy were either holding their own or demanding more workers. Unemployment in Seattle ran over 11 percent, but in Atlanta (including Marietta), the rate was a little over 3 percent. The value of economic diversity would seem to be apparent.[5]

No agency seems to know for sure the exact numbers of technically trained people who are unemployed.. By occupational category, the Bureau of Labor Statistics estimates that more than 200,000 white collar workers in professional and technical categories are out of work.[6] In California, the National Registry for Engineers estimates that 100,000 of the 2 million scientists and engineers in the U.S. are unemployed.[7] Those who graduate from engineering and scientific courses this year will likely cause that number to increase.

The Federal government has taken a number of actions to speed up the placement of the unemployed, and mitigate it effects, although it is still too early to assess the effectiveness of these measures. The number of weeks for unemployment compensation eligibility has recently

been extended an additional 13 weeks for a total of 39 weeks; some $42 million from the national manpower training program (the Manpower Development and Training Act) has been directed to the needs of this newly unemployed group; and, efforts are being made to expand our national job data bank, which is still in the germinal stage. Other measures such as major industry loans to undergird companies affected by changing priorities, have been considered; and, one recently authorized by the Congress for the Lockheed Corporation. In addition, the President signed into law July 12, 1971 the Emergency Employment Act of 1971 to expand employment in public service occupations. One-third of the participants in these programs are to be working at the professional level.

One of the greatest barriers for re-employment of these technical and professional workers is, ironically, one which has caused the disadvantaged the most hardship: there is not enough information concerning availability of jobs; their whereabouts; where to apply; qualifications, etc. It is hoped that both the efforts of the Federal Government and private professional groups in developing data banks will alleviate some of this problem. Engineers and technical people are finding, too, that they must drastically increase their job-finding skills. Many of their professional societies are helping them do this. For example, the National Society for Professional Engineers, in cooperation with the California Human Resources Division, has developed a highly sophisticated registry to assist workers locate jobs.

The American Institute of Aeronautics and Astronautics conducted a successful workshop for jobless aerospace engineers in Los Angeles which, with the assistance of Federal funds, has since been repeated to reach an estimated 6,000 engineers. The Institute found that job titles were serious barriers to the re-employment of scientists and engineers, but that the barrier was more imaginary than real. In spite of the specific job title containing the term "aerospace", the professionals were shown that their job titles were not indicative of their specific skills nor their educational background. The workshops attempted to show them how their education and skills could have relevance to other fields. The engineer's own preconceived notions of what constituted his specialization and abilities proved the greatest barrier in making the transition to other employment. They are frequently a barrier in the minds of employers, too.

To date, formal retraining efforts for these highly skilled persons have been of limited application and scope. Supported by Federal funds, the University of California's Irvine campus is retraining 34 middle-aged and unemployed aerospace engineers for new occupations in the field of environment engineering. California has also established training programs under the Manpower Development and Training Act for an estimated 3,653

persons, 40 percent of whom are professional engineers or scientists. The more highly-skilled occupational retraining areas include bio-medical, technical marketing, as well as the environment engineering fields. These Federal retraining efforts are authorized under legislation, which has primarily trained below the professional level, although the law does permit refresher training for unemployed professionals. Stipends are generally too low and do little to keep the engineer solvent while he is in training. With mortgages and car payments, his overhead is simply greater than that of the disadvantaged trainee.

Recently a variety of legislation has been introduced into the Congress which, if enacted, would cushion some of the effects of sudden changes in our national priorities. One, patterned after the Trade Expansion Act, which provides assistance to both industries and individuals, would help individuals in affected industries by providing relocation payments, readjustment allowances, counseling and training services. Other legislation would provide funds to redirect the research and development programs of aerospace industries into civilian-related priorities. And still another seemingly unrelated piece of legislation to nationally convert to the metric system, could employ thousands of technically-trained people in the conversion process!

Another major Federal effort, a pilot placement program, provides grants to local and state governments to conduct orientation and on-the-job training in public service jobs for 400 to 600 displaced engineers and scientists. Potential job areas for them include middle-level management, planning, evaluation, information handling, and health, pollution control, physics and chemistry, and engineering-related jobs.[8]

The extent of success of these programs and others undertaken both at Federal initiative and by professional societies, and other groups, is unknown at the moment. One thing we have yet to have demonstrated is the extent to which skills have common applicability and the ease with which they can be transferred between industries. One of the factors in economic expansion is the speed with which technology is transferred into wider application. In this regard, it has been suggested that the current displacements might be a blessing in disguise, as the best way to transfer technology, is to transfer the people who have it. It might be added that companies must have a financial incentive to put those skills to use.

Some of the aerospace related industries are altering their programs, shifting into new areas of need. The Federal Department of Transportation has contracts with private research firms which, prior to cutbacks, applied little of their talent to nonmilitary problems. Under their contracts now, they are working on solutions to urban transportation problems. Other former defense or aerospace related industries are

developing a high-speed urban tracked system; building cars for the rapid transit systems of major metropolitan areas; and, one is developing an air cushion vehicle for France.

While we are reasonably sure that most of these skilled people can become re-employed, it will not be without personal hardship, and many are not likely to immediately get work comparable in salary and skill level or prestige to their former employment. The Bureau of Labor Statistics reports that many of these skilled people, until they can find suitable employment, are holding jobs that range from store clerks to science and mathematics instructors, gardeners, and gas station attendants. Age discrimination, too, is a fact of life for many of them. Most of these people have been out of college or graduate school for quite some time. And, as one unemployed engineer put it, "Employers seem to be looking for people who are 19 years old with 25 years of experience".[9]

A number of professional self-help groups have arisen , with the primary objective being jobs and developing the skills to get them. But they are potentially a white-collar lobbying group as well. One of the oldest and largest of these groups is California's Experience Unlimited (EU), which is run by unemployed professionals for the unemployed. Even with a concentrated effort, however, EU has been able to effect only a 13 percent placement -- 915 out of its 7,000 registrants.[10] They have found that many employers consider their registrants "over qualified", and tend to be suspicious that they would immediately desert should aerospace or other federal contracts open up again. EU has found that many of the newest registrants are not aerospace workers, but part of a secondary wave of unemployment from other parts of the private sector caused when sub-contracts to government defense or aerospace terminated and/or by the general "cooling" of the economy.

We can only conjecture about the social effects of cutbacks in employment among these highly skilled workers. Unemployment in the U.S. has affected a relatively small percentage of the population; therefore, it has always been difficult for the affluent majority to identify with the concerns of the less affluent minority. Now, many of the affluent are finding that after great personal exertion they too must resort to unemployment compensation and other programs that were always considered by them as programs for "another group".

If these types of shared experiences stimulate fellow-feeling, it could result in an interesting coalition of pressure groups urging the Congress to enact programs that will cushion some of the vagaries of the economy. While the unemployed technical and professional people do not even now constitute a large percentage of the unemployed population, they are among its most articulate members and therefore may have a greater

potential for influencing the legislative decision-making processes.

The U.S. is also witnessing interesting developments in the media. Since prior to now, unemployment always happened to "somebody else", it has rarely been dealt with in media except as a social aberration. Recently, however, more and more mass media exposure have been given to the problem such as national network TV documentaries dealing with unemployment, and situation comedies portraying how middle-class people get through an unemployment crisis. Newspapers carry articles on "Survival Plans for an Unemployed Engineer" and "What to do When the Ax Falls". [11] It comes across in these programs that the unemployment was not due to personal failure; it was "not of one's own making". This is in contrast to the typical attitude expressed toward the disadvantaged, that "they could help themselves if only they would".

Engineers, scientists and their associate professionals are developing a new awareness of themselves as a group in the labor force. Some are talking about unionization. They are now reexamining many of the aspects of their jobs that they tolerated in good times, including --

- The long hours of overtime without pay, which some say is an excuse on the part of the employer for not hiring more personnel;

- The lack of "portability" of fringe benefits. A professional and highly-skilled associate mid-level professional must have an enticing raise to move to other employment because more often than not they cannot transfer leave accrued from one employer to another nor carry pension plans with them;

- Professionals and associate professionals over 40 years of age are finding in the present employer's market, that they are being rejected for younger applicants; and,

- Employers now are demanding qualifications and experience not commensurate with the salaries they are willing to pay.

Whether it will be unionization or some other form of organization, many scientists, engineers, and technicians are, for the first time, seeking a new and different kind of job advocate beyond the professional society. This would seem to be further evidence in support of Peter Drucker's assertion that today's "knowledge worker" is really the descendent of the industrial worker and not the independent professional of old. The industrial worker found high advocate in the union. Now the scientists, engineers and technicians are seeking theirs.

Effects of Changing National Priorities:
Displaced Scientists, Engineers and Technicians

APPENDIX FOOTNOTES

1. Pearson, The Honorable James B., Senator from Kansas, Remarks before the Senate as reported in the Congressional Record, February 25, 1971, S-1927.

2. Samuelson, Robert J., "Ailing Aerospace," The Washington Post, April 4, 1971.

3. Ibid.

4. Employment Security Department, State of Washington, "Annual Manpower Planning Report," 1971.

5. Carter, Philip D., "Aircraft Employees: Engineering to Meter Reading...," The Washington Post, April 6, 1971.

6. "Who Are the Unemployed?" U.S. News and World Report, November 16, 1970, p. 55.

7. Hunsinger, Susan, "White-collar Unemployed Turn to 'Mending'," The Christian Science Monitor, February 3, 1971, p. 10.

8. Cohn, Victor, "New Program Will Retrain Aerospace Scientists," The Washington Post, March 9, 1971.

9. Hunsinger, Susan, op.cit.

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T A B L E S

TABLE 1

Employed Persons by Occupation Group*
(In thousands)

Occupation Occupation	Annual Average 1970	Percent Distribution
Total	78,627	100.0**
White Collar Workers	37,997	48.3
Professional and technical	11,140	14.2
Medical and other health	1,743	
Teachers, except college	2,479	
Other professional and technical	6,918	
Managers, officials, and proprietors	8,289	10.5
Salaried workers	6,045	
Self-employed workers, retail trade	1,096	
Self-employed workers, except retail trade	1,148	
Clerical workers	13,714	17.4
Stenographers, typists, and secretaries	3,504	
Other clerical workers	10,211	
Sales workers	4,854	6.2
Retail trade	2,957	
Other sales workers	1,897	
Blue Collar Workers	27,791	35.3
Craftsmen and foremen	10,158	12.9
Carpenters	830	
Construction craftsmen, except carpenters	1,933	
Mechanics and repairmen	2,792	
Metal craftsmen, except mechanics	1,215	
Other craftsmen and kindred workers	1,900	
Foremen, not elsewhere classified	1,488	

* Employment and Earnings, Volume 18, No. 2, August 1971, Bureau of Labor Statistics.

** Percents do not add to 100 since this is a partial table including only those data pertinent to this paper.

TABLE 2

Employees on Nonagricultural Payrolls, by Industry*
(In thousands)

Industry	Annual Average 1970	Percent Distribution
Total	70,669	100.0
Goods-producing	23,369	33.1
Mining	622	.9
(metal, coal, oil and gas)		
(nonmetallic except fuel)		
Contract construction	3,346	4.7
(general building contractors)		
(heavy construction contractors)		
(special trade contractors)		
Manufacturing	19,401	27.5
Durable goods	11,210	15.9
(ordnance and accessories, lumber)		
(and wood products, furniture and)		
(fixtures, stone, glass and clay,)		
(primary metal industries, fabri-)		
(cated metal, machinery, electrical)		
(equipment, transportation equip-)		
(ment, instruments and related)		
(products, misc. manufacturing)		
Nondurable goods	8,190	11.6
(food, tobacco, textile, apparel,)		
(paper, printing, chemicals, petro-)		
(leum and coal, rubber and plastics,)		
(leather and leather products)		
Service-producing	47,300	66.9
Transportation and public utilities	4,499	6.4
Wholesale and retail trade	14,947	21.2
Wholesale trade	3,849	5.4
Retail trade	11,098	15.7
Finance, insurance, and real estate	3,679	5.2
Services	11,577	16.4
(hotels and other lodging places,)		
(personal services, misc. business)		
(services, misc. repair services,)		
(motion pictures, medical and other)		
(health services, legal services,)		
(educational services, misc.)		

TABLE 2, Continued

Government	12,599	17.8
Federal	2,707	3.8
State	9,893	14.0

* Employment and Earnings, Volume 18, No. 2, August 1971, Bureau of Labor Statistics.

TABLE 3

ENVIRONMENTAL MANPOWER

Estimated Available and Projected to 1980*

	Practitioners in 1970	Practitioners needed 1980
Ecology	4,300	12,000
Geology	22,800	33,400
Geophysics	6,800	10,400
Meteorology	4,000	12,000
Oceanography	5,800	40,000
Forestry	25,000	37,000
Forestry Aids	13,000	23,800
Range Management	6,000	8,000
Soil Conservation	26,000	30,000
Wildlife Conservation	15,000	20,000
Fisheries Conservation	4,500	7,500
Recreation and Parks	215,790	220,000
Architecture	34,000	61,600
Engineering (Construction and Consulting)	40,000	70,000
Landscape Architecture	8,500	14,500
Urban Planning	7,000	16,600
Environmental Protection	217,500	565,000

* Opportunities in Environmental Careers, by Odom Fanning, Vocational Guidance Manuals, 1971

TABLE 4

Participation in the Core Educational Systems*

Trends in Education: United States, 1959-60 to 1979-80

Characteristic	Fall 1959	Fall 1969	Percent Change 1959 to 1969	Fall 1979 (projected)	Percent Change 1969 to 1979
	Thousands			Thousands	
School-age population:					
5-13	32,074	37,288	16	33,924	-9
14-17	11,135	15,553	40	16,327	5
18-21	9,280	14,236	53	16,978	19
18 (nearest birthday)	2,574	3,682	43	4,276	16
Enrollment:					
K-grade 12	40,782	51,319	26	51,000	-1
K-8	31,511	36,897	17	34,600	-6
9-12	9,271	14,422	56	16,400	14
Public	35,182	45,619	30	45,600	0
K-8	26,911	32,597	21	30,600	-6
9-12	8,271	13,022	57	15,000	15
Nonpublic	5,600	5,700	2	5,400	-5
Higher Education:					
Degree credit	3,377	7,299	116	11,075	52
Public	1,984	5,260	165	8,671	65
Private	1,393	2,040	46	2,403	18
4-year	2,968	5,902	99	8,629	46
2-year	410	1,397	241	2,446	75
Undergraduate	3,046	6,411	110	9,435	47
First time	822	1,699	107	2,477	46
Graduate	331	889	169	1,640	84
Men	2,161	4,317	100	6,251	45
Women	1,216	2,982	145	4,823	62
Full-time	2,314	5,198	125	7,669	48
Part-time	1,063	2,101	98	3,405	62
Full-time Equivalent	2,665	5,891	121	8,792	49
Nondegree credit	194	618	219	1,183	91
Public	149	580	289	1,135	96
Private	45	38	-16	48	26
	1959-60	1969-70		1979-80	
High school graduate	1,864	2,978	60	3,759	26
Public	1,633	2,658	63	3,439	29

Characteristic	Fall 1959	Fall 1969	Percent Change 1959 to 1969	Fall 1979 (projected)	Percent Change 1969 to 1979
Nonpublic	231	320	39	320	0
Men	898	1,478	65	1,901	29
Women	966	1,500	55	1,858	24
Percent of 18-year-olds graduating from high school	63.7	77.1	--	88.8	--
Percent of high school graduates going on to college	50.1	59.8	--	65.2	--
Earned degrees:					
Bachelor's and first-professional	389	784	102	1,133	45
Men	253	456	80	608	33
Women	136	328	141	525	60
Master's	77.7	219.2	182	432.5	97
Men	52.0	135.4	160	257.9	90
Women	25.7	83.9	226	174.6	108
Doctor's	9.8	29.3	199	62.5	113
Men	8.8	25.5	190	54.6	114
Women	1.0	3.8	280	8.0	111

*Source: "Statistics and Trends in Education: 1959-60 to 1979-80," National Center for Educational Statistics, U.S. Office of Education, Washington, D.C.